

Midocean University

College of Management

Department of Business Administration



Proposal Title:

**The Role of Operations Management in Improving Supply Chain
Resilience at Saudi Basic Industries Corporation (SABIC)**

Prepared by: Firas Bukhari

Supervised by: Dr. Fayez Jrad

Dr. Alfaisal Hasan

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1.1. Introduction

In an ever-evolving global landscape, where businesses are constantly challenged by a variety of economic, environmental, and geopolitical factors, the concept of supply chain resilience has become a cornerstone for sustainable and successful business operations. The COVID-19 pandemic, trade wars, natural disasters, and rapid technological advancements have highlighted the vulnerabilities within global supply chains, leading organizations to reassess and revamp their strategic approaches. Central to this effort is the role of operations management, which serves as the backbone for ensuring that supply chains are equipped to withstand, adapt, and thrive despite unforeseen challenges (Aljabhan,20223).

Operations management encompasses the comprehensive planning, organizing, and supervising of processes related to the production and delivery of goods and services. By leveraging principles such as process optimization, risk management, resource allocation, and continuous improvement, organizations can create agile and robust supply chains that are not only efficient in their day-to-day operations but are also resilient to disruptions. The importance of this discipline cannot be overstated, as the ability to maintain continuity of supply in times of crisis can determine a company's competitive edge and long-term viability (Piprani et al.,2022).

The role of operations management in enhancing supply chain resilience involves a multi-faceted approach that integrates advanced technology, strategic partnerships, flexible logistics, and proactive risk assessment. For instance, the adoption of data-driven technologies such as artificial intelligence (AI), predictive analytics, and Internet of Things (IoT) solutions allows companies to anticipate disruptions, identify potential weak points, and react swiftly to mitigate impacts. Furthermore, effective operations management fosters collaboration across the supply chain, encouraging partnerships that contribute to shared knowledge and resources, which are crucial during crisis periods (Spieske & Birkel,2021).

A resilient supply chain is not solely about reacting to disruptions after they occur; it is also about building the capacity to prevent, withstand, and recover from such events. Operations management plays a key role in implementing preventive measures such as diversifying supplier bases, maintaining strategic stockpiles, and developing dual sourcing strategies to reduce

dependency on single points of failure. By incorporating flexibility and redundancy into their supply chains, organizations can navigate disruptions with minimal impact on service levels and customer satisfaction (Lu et al.,2024).

Additionally, operations management helps companies embed resilience into their supply chains by focusing on the continuous improvement of processes and systems. The adoption of lean management and agile practices enables firms to streamline operations and respond to changes more effectively. This continuous cycle of monitoring, analyzing, and refining operations ensures that companies remain prepared for both incremental changes and sudden disruptions (Shaik, 2021).

Understanding the pivotal role of operations management in improving supply chain resilience offers valuable insights into how businesses can build long-term sustainability. The alignment between strategic operational practices and supply chain resilience objectives creates an ecosystem where companies can not only respond to disruptions but also seize opportunities for growth and innovation in challenging times.

1.2. Problem Statement

Saudi Basic Industries Corporation (SABIC), one of the largest and most influential petrochemical companies globally, operates in a complex and highly competitive industry that is subject to significant challenges. These challenges include fluctuating global demand, geopolitical uncertainties, disruptions from natural disasters, and rapidly evolving technological advancements. While SABIC has made substantial investments in optimizing its supply chain, ensuring resilience in the face of unexpected disruptions remains a pressing concern. The absence of a fully resilient supply chain exposes the company to risks that can lead to delays, increased operational costs, and potential loss of market share. Operations management plays a critical role in addressing these vulnerabilities by enhancing the capacity of the supply chain to adapt, recover, and maintain performance under pressure. However, SABIC faces challenges in integrating advanced operations management practices that can proactively mitigate these disruptions and enhance overall resilience. Factors such as dependence on specific suppliers, limited redundancy in logistics, and gaps in technology integration can hinder the effectiveness of SABIC's supply chain operations.

1.3. Research Significance

1.3.1 Theoretical Significance:

The study of operations management in improving supply chain resilience, specifically within the context of a major global corporation like Saudi Basic Industries Corporation (SABIC), contributes significantly to the academic body of knowledge in both supply chain management and operations management fields. Theoretically, this research deepens the understanding of how operational strategies can be systematically designed and integrated to build supply chain resilience. It sheds light on the interactions between key elements such as risk management, process optimization, and technological integration in strengthening supply chains. Furthermore, it expands on existing theories of supply chain agility, resilience frameworks, and risk mitigation strategies, offering a comprehensive examination of their applicability in large-scale, high-stakes industrial settings.

This research can also contribute to the development of new models or frameworks that link operations management practices with resilience outcomes, potentially serving as a reference for future studies. By focusing on the petrochemical industry, this study fills a gap in the literature where sector-specific analyses are limited, providing a nuanced understanding of how industry characteristics influence the implementation and effectiveness of operations management practices.

1.3.2 Practical Significance:

From a practical perspective, this research holds substantial value for industry professionals, particularly those involved in operations, logistics, and supply chain management at SABIC and similar large-scale industrial corporations. The insights gained from this study can inform decision-makers on the best practices and strategies to enhance supply chain resilience. By applying the findings, SABIC can strengthen its ability to manage disruptions, improve response times, and reduce the overall impact of crises on operations, leading to cost savings and better service reliability.

The practical implications extend beyond SABIC, serving as a valuable guide for other companies in the petrochemical sector and broader manufacturing industries facing similar challenges. This research can support managers in designing more adaptive supply chains,

integrating risk management processes, and leveraging advanced technologies such as predictive analytics and supply chain digitization to anticipate and mitigate potential disruptions.

Moreover, this study offers practical recommendations on implementing flexible logistics strategies, diversifying supplier networks, and establishing continuous improvement processes that contribute to long-term operational stability. By emphasizing actionable strategies, the research provides a roadmap for organizations to build more resilient supply chains that align with their strategic objectives, ultimately enhancing their competitiveness in an unpredictable global market.

1.4. Research Objectives:

1. To assess the current level of application of operations management practices within the Saudi Basic Industries Corporation (SABIC).
2. To examine the role of operations management in enhancing the flexibility and adaptability of SABIC's supply chain.
3. To identify and analyze the challenges SABIC faces in implementing operations management practices within its supply chain.
4. To propose strategies and best practices for improving the integration of operations management in SABIC's supply chain to strengthen its resilience.

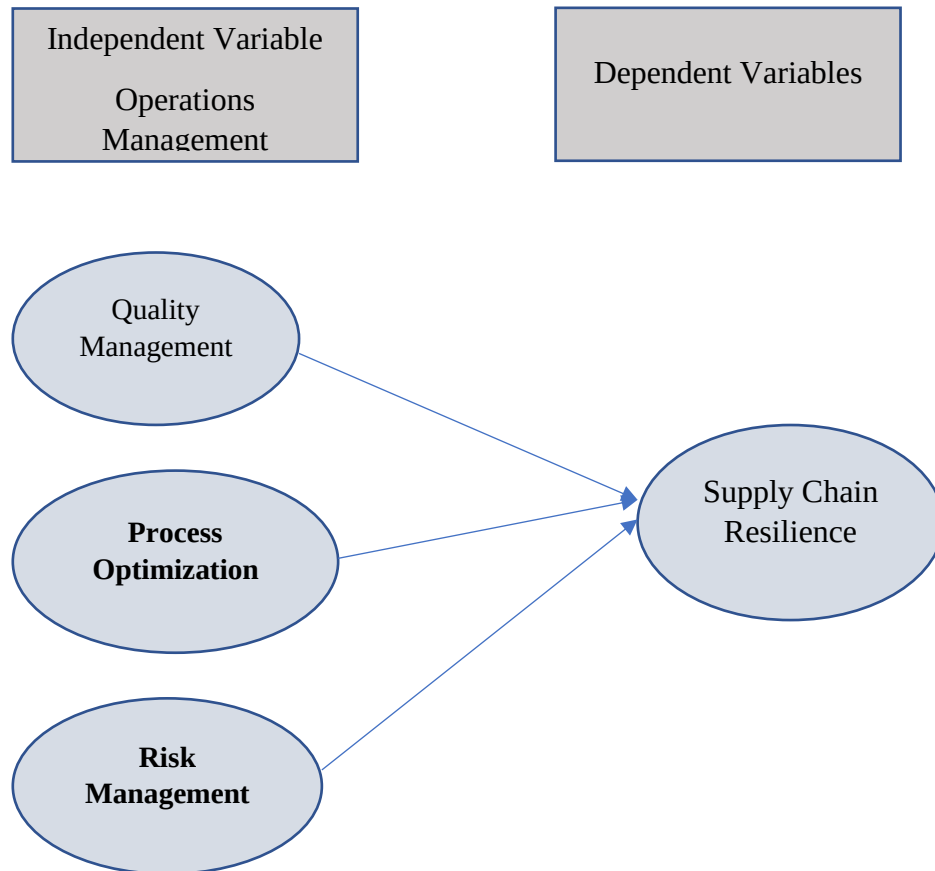
1.5. Research Questions:

1. What is the level of application of operations management in the Saudi Basic Industries Corporation (SABIC)?
2. What is the role of operations management in improving the flexibility of the supply chain in the Saudi Basic Industries Corporation (SABIC)?
3. What are the challenges facing the application of operations management to the supply chain in the Saudi Basic Industries Corporation (SABIC)?
4. How can SABIC effectively overcome these challenges to ensure a more resilient and adaptive supply chain?

1.6. Research Hypotheses

It is clear to us from the earlier figure, that the current research attempts to The Role of Operations Management in Improving Supply Chain Resilience at Saudi Basic Industries Corporation (SABIC)

- ✓ Independent Variable : Operations Management with Dimensions (Quality Management, **Process Optimization, Risk Management**)
- ✓ Dependent Variables: Supply Chain Resilience



1. H1: There is a statistically significant effect of quality management within operations management on the supply chain resilience at Saudi Basic Industries Corporation (SABIC).
2. H2: There is a statistically significant effect of process optimization within operations management on the supply chain resilience at Saudi Basic Industries Corporation (SABIC).
3. H3: There is a statistically significant effect of risk management within operations management on the supply chain resilience at Saudi Basic Industries Corporation (SABIC).

1.7. Literature review

The study by (Zherlitsyn & Kravchenko, 2016) aimed to investigate the relationship between operations and financial management practices and their combined effect on enhancing

supply chain resilience. Zherlitsyn and Kravchenko sought to identify how strategic integration of these management practices could build a robust supply chain capable of withstanding various disruptions and challenges that arise in a dynamic business environment. To achieve this objective, the authors adopted a theoretical and analytical approach, using existing literature and case studies to explore the interplay between operations and finance management in strengthening supply chains. They analyzed a variety of cases involving supply chain disruptions and examined how organizations applied operations and finance management strategies to mitigate impacts. A qualitative assessment of secondary data and case studies from companies recognized for resilient supply chain practices provided the foundation for their analysis. The results indicated that integrating operations and finance management significantly contributes to enhancing supply chain resilience. Companies that aligned their operational processes with financial strategies were found to be better equipped to manage and respond to disruptions. The study emphasized that risk management practices, particularly those involving financial preparedness such as maintaining emergency funds or financial buffers played a central role in supporting rapid operational adjustments during crises. Additionally, the research highlighted that collaboration between financial and operational teams allowed for more cohesive response plans, reducing downtime and speeding recovery. Proactive measures such as investing in technology and ongoing process improvements were also identified as essential in strengthening resilience, as they enhance visibility and facilitate more informed decision-making across the supply chain. Overall, the study underscored the importance of integrating both operational efficiency and financial planning to develop resilient supply chains capable of adapting and sustaining performance even under challenging conditions.

The doctoral dissertation by Sayed (2017) aimed to explore the application of safety and resilience engineering within various industries in Saudi Arabia. The study sought to understand the key strategies and frameworks used by these industries to enhance safety and resilience in their operations, with a focus on how these practices contribute to minimizing risks and improving overall system performance in complex and potentially hazardous environments. Sayed employed a qualitative research approach that combined comprehensive literature reviews with case studies and field research within Saudi Arabian industries. The methodology included interviews with industry experts, engineers, and managers, as well as an analysis of industry reports and operational data. This mixed-methods approach provided a detailed examination of the current

practices, challenges, and outcomes related to safety and resilience engineering in the context of the region's industrial sector. The study revealed that safety and resilience engineering practices were increasingly being integrated into Saudi Arabian industries, particularly in sectors such as oil and gas, manufacturing, and petrochemicals. Key findings indicated that while there were significant advancements in adopting safety protocols, challenges remained in achieving comprehensive resilience due to factors such as resource constraints, workforce training gaps, and the need for more robust risk assessment tools. Sayed found that industries employing proactive safety measures and incorporating resilience engineering principles were better equipped to handle disruptions and maintain operational continuity. Strategies that emphasized preventive maintenance, real-time monitoring systems, and emergency response planning were highlighted as crucial in mitigating risks and enhancing resilience. The study also pointed out that collaborative efforts between industry stakeholders, regulatory bodies, and technological partners were essential in overcoming existing challenges. The dissertation concluded that while significant progress had been made, there was still room for improvement in the adoption of integrated safety and resilience frameworks. The author recommended enhancing workforce training, investing in advanced technology for real-time monitoring and risk assessment, and fostering a culture of continuous improvement to build safer and more resilient industrial systems in Saudi Arabia.

The study by **(Kamalahmadi et al.,2022)** aimed to examine how flexibility and redundancy as strategic elements contribute to enhancing the resilience of supply chains when faced with disruptions. The research sought to quantify the effects of these strategies and determine their relative importance in helping supply chains adapt, recover, and maintain operations during crises. The authors used a quantitative research approach, leveraging survey data collected from supply chain professionals across various industries. They applied statistical methods, including structural equation modeling (SEM), to analyze the relationships between flexibility, redundancy, and supply chain resilience. This approach allowed the researchers to measure the direct and indirect effects of these variables on the overall resilience of supply chains. The findings of the study underscored that both flexibility and redundancy play significant roles in enhancing supply chain resilience. Flexibility characterized by the ability to reconfigure resources, processes, and supplier relationships proved to be a critical factor in allowing supply chains to adapt quickly to unexpected disruptions. On the other hand, redundancy the strategic availability of backup resources and alternative suppliers helped supply chains maintain continuity and reduce downtime

during disruptions. The study revealed that while both strategies were effective, their relative impact varied depending on the nature and duration of the disruption. Flexibility was more beneficial for short-term, rapidly changing disruptions, whereas redundancy was particularly valuable for prolonged or severe disruptions where backup resources were essential for sustained operation. The combined use of flexibility and redundancy strategies provided the most robust response to various types of disruptions. The authors concluded that organizations seeking to improve their supply chain resilience should prioritize a balanced approach, incorporating both flexibility and redundancy. Investments in training, technology, and strategic partnerships were recommended to enhance these capabilities. The study emphasized that understanding the specific needs and characteristics of the supply chain would guide the optimal allocation of resources between flexibility and redundancy measures.

The doctoral dissertation by **Aljabhan (2023)** aimed to explore the application of supply chain risk management (SCRM) practices in maritime firms within the Kingdom of Saudi Arabia. The study focused on identifying the primary risks these firms face and evaluating the strategies employed to mitigate and manage these risks effectively. The objective was to provide insights into the current state of SCRM in the maritime sector and propose improvements to enhance resilience and operational stability. Aljabhan adopted a case study approach, combining both qualitative and quantitative research methods. Data were collected through interviews with key stakeholders, surveys of maritime professionals, and analysis of company reports and industry documents. This approach enabled an in-depth examination of risk management practices and their effectiveness in real-world maritime operations. The study focused on various aspects of SCRM, including risk identification, assessment, mitigation strategies, and the overall integration of these practices into the supply chain framework of maritime firms. The study found that supply chain risk management practices were implemented to varying degrees across maritime firms in Saudi Arabia. Key risks identified included operational disruptions, logistical challenges, geopolitical tensions, and environmental hazards. The research highlighted that firms employing proactive risk management practices, such as comprehensive risk assessments and collaborative risk-sharing strategies with partners, were better positioned to maintain continuity and reduce the impact of disruptions. Despite the advancements in some areas, the study revealed challenges such as resource limitations, insufficient training, and a lack of advanced technological tools for real-time risk monitoring. These challenges hindered the ability of some firms to fully implement robust

SCRM practices. Aljabhan emphasized the importance of integrating technology, such as predictive analytics and maritime tracking systems, to enhance real-time risk assessment and response capabilities. The dissertation concluded that for maritime firms to achieve a higher level of resilience, a more cohesive approach to SCRM was necessary. Recommendations included fostering partnerships with technology providers, investing in training programs for supply chain personnel, and developing a more integrated risk management culture across the organization. These measures were seen as vital steps toward ensuring the stability and reliability of maritime supply chains in the Kingdom of Saudi Arabia.

The study conducted by **(Hussain et al., 2023)** aimed to explore how lean transformation principles can be utilized to enhance resilience in disaster relief operations management. The primary objective was to evaluate the effectiveness of lean methodologies in optimizing disaster response processes and strengthening the adaptability and robustness of relief operations in the face of unforeseen challenges. To achieve this, the authors employed a case study-based qualitative research approach, gathering data from disaster relief organizations through interviews, field observations, and operational report analyses. This approach allowed for a detailed examination of how lean principles, such as waste reduction, process standardization, and continuous improvement, were applied in practice and how these principles contributed to building resilience within disaster relief efforts. The study found that incorporating lean transformation significantly improved the resilience of disaster relief operations by making processes more efficient and responsive. Lean practices, including the elimination of non-value-adding activities, simplification of workflows, and fostering a culture of continuous improvement, enabled more effective responses to disruptions. The key benefits observed included faster response times due to streamlined processes, improved resource utilization to ensure critical supplies and equipment were used effectively, and enhanced coordination among stakeholders, leading to better communication and fewer operational bottlenecks. However, the study also acknowledged challenges in adopting lean practices in disaster scenarios, such as resistance to change, the need for comprehensive training of personnel, and the complexities of applying lean methods in rapidly changing environments. Despite these challenges, the research showed that when implemented effectively, lean transformation provided a strong foundation for building resilient operations capable of handling sudden and severe disruptions. The authors concluded that while lean methodologies offer substantial benefits to disaster relief operations, they need to be customized

to fit the unique demands of these contexts to maximize their effectiveness. The study recommended investments in training, technology, and strategic planning to support the adoption of lean practices and bolster operational resilience. Additionally, the research emphasized that combining lean methodologies with agile strategies could further enhance disaster response capabilities, creating more adaptable and robust relief operations.

The study conducted by (**Hafidy et al., 2024**) aimed to investigate how the integration of operations management and Industry 4.0 technologies can enhance supply chain resilience. The research sought to identify the synergies between traditional operations management practices and advanced technological solutions, such as automation, IoT, and data analytics, in bolstering the adaptability and robustness of supply chains. The authors employed a mixed-methods approach that included a review of existing literature and an analysis of case studies from industries adopting Industry 4.0 practices. The study combined qualitative insights from industry reports and expert interviews with quantitative data analysis to evaluate the impact of implementing advanced operations management supported by Industry 4.0 technologies. This comprehensive approach provided an in-depth view of the benefits, challenges, and potential of blending traditional and modern strategies for supply chain management. The study highlighted that the integration of operations management with Industry 4.0 technologies significantly improves supply chain resilience. Key findings indicated that technologies such as IoT, predictive analytics, and real-time data processing allow companies to anticipate disruptions, optimize logistics, and maintain continuous operation even in complex environments. Operations management practices, when combined with these technologies, provided a structured framework for enhancing flexibility and responsiveness. The authors found that the most resilient supply chains were those that incorporated automation, real-time monitoring, and advanced data analytics, enabling companies to swiftly adapt to unexpected changes. Additionally, the research pointed out that while Industry 4.0 offers substantial benefits, challenges such as the need for skilled labor, high initial investments, and technological integration complexities were barriers that companies needed to address for full-scale implementation. The study concluded that to maximize the potential of operations management and Industry 4.0 for supply chain resilience, companies must invest in workforce training, adopt a phased approach for technology implementation, and foster collaboration across departments. By doing so, organizations can build a more agile and robust supply chain capable of withstanding disruptions and maintaining competitive advantage.

1.8. Theoretical foundations of the study

First Axis: Operations Management

1.8.1 Definition of Operations Management

Operations management is a critical function within an organization that focuses on the efficient and effective administration of production and service processes. At its core, operations management involves planning, organizing, and supervising activities related to the transformation of inputs (such as raw materials, labor, and energy) into outputs (products or services). The primary goal is to ensure that these processes are optimized to produce high-quality outputs in a cost-effective manner, meeting customer expectations and business objectives (Terwiesch,2023).

The scope of operations management extends beyond day-to-day management tasks and includes strategic decision-making that affects the long-term sustainability and competitiveness of an organization. This function encompasses a variety of activities such as process design, capacity planning, inventory management, supply chain coordination, and quality control. Each of these activities plays a role in shaping how resources are utilized and how workflows are structured to maximize efficiency and productivity.

Modern operations management has evolved significantly with advancements in technology and shifts in global business practices. Concepts like Lean Management, which focuses on eliminating waste and enhancing value-added activities, and Total Quality Management (TQM), which prioritizes continuous improvement and quality assurance, have become fundamental aspects of operations management. Additionally, Six Sigma methodologies are used to reduce process variability and improve quality, contributing to more consistent and reliable production outputs. Operations management also plays a vital role in supply chain management by ensuring seamless integration and coordination across different levels of the supply chain. This includes collaborating with suppliers, optimizing logistics, and managing inventory levels to reduce costs and avoid disruptions. By strategically aligning operations management practices with overall business goals, companies can build a resilient framework that supports sustained growth and customer satisfaction (Choi et al.,2022).

1.8.2 Scope of Operations Management

The scope of operations management is extensive and encompasses a range of activities that are essential for the successful production and delivery of goods and services. It integrates both strategic and operational aspects to ensure that an organization can achieve its objectives

efficiently. Here, the primary areas within the scope of operations management are detailed (Helo & Hao, 2022).

1. **Process Design and Management:** Process design involves mapping out and structuring production or service processes to maximize efficiency and output quality. Operations managers develop and implement workflows that align with the organization's goals, emphasizing the smooth and seamless transformation of inputs into outputs. This includes the adoption of methodologies such as Lean and Six Sigma to streamline processes and reduce waste.
2. **Capacity Planning:** Operations management involves determining the optimal level of resources needed to meet production targets or service demands. Capacity planning ensures that an organization can respond to fluctuations in demand without underutilizing or overextending resources. This is essential for maintaining a balance between meeting customer needs and optimizing costs.
3. **Supply Chain Management and Coordination:** The scope extends to managing and coordinating the supply chain, which includes sourcing raw materials, managing suppliers, and ensuring timely delivery of products or services. Effective operations management in supply chain coordination helps reduce costs, minimize delays, and improve overall efficiency, thus enhancing customer satisfaction and competitive advantage.
4. **Inventory Management:** Managing inventory levels is a critical part of operations management to ensure that there is enough stock to meet demand without incurring unnecessary holding costs. Operations managers use various inventory control techniques, such as Just-In-Time (JIT) and Economic Order Quantity (EOQ), to optimize inventory levels and reduce wastage.
5. **Quality Control and Assurance:** Operations management ensures that products and services meet quality standards and comply with customer and industry expectations. Quality control involves the continuous monitoring and testing of processes and outputs, while Total Quality Management (TQM) promotes a culture of continuous improvement to maintain high standards.
6. **Logistics and Distribution:** The logistics component involves the efficient movement of goods from the point of origin to the end customer. Operations managers oversee

transportation, warehousing, and distribution networks to ensure timely and cost-effective delivery. Effective logistics management reduces lead times and improves service levels.

7. **Technology Integration:** Modern operations management incorporates the use of technology to enhance efficiency and data-driven decision-making. This includes integrating tools such as Enterprise Resource Planning (ERP) systems, predictive analytics, and automation technologies to streamline processes and provide real-time insights into operations.

1.8.3 Principles of Operations Management

Operations management is driven by a set of core principles that guide the effective planning, execution, and optimization of production and service processes. Key principles include (Benjaafar & Hu, 2020).

1. **Customer Focus:** Prioritizing customer satisfaction by aligning processes to deliver value that meets or exceeds customer expectations.
2. **Continuous Improvement (Kaizen):** Emphasizing ongoing refinement of processes to enhance efficiency and quality over time.
3. **Efficiency and Resource Optimization:** Maximizing output while minimizing resource use to achieve cost-effectiveness and productivity.
4. **Quality Management:** Ensuring consistent quality in processes and outputs through frameworks such as Total Quality Management (TQM) and Six Sigma.
5. **Flexibility and Adaptability:** Building processes that can respond to market changes, technological advancements, and disruptions.
6. **Sustainability and Environmental Responsibility:** Implementing eco-friendly practices to minimize environmental impact.
7. **Process Standardization:** Creating consistent workflows to reduce variability and ensure predictable output.
8. **Data-Driven Decision Making:** Using data and analytics to inform decisions and optimize processes.
9. **Risk Management:** Identifying and mitigating risks to maintain continuity during disruptions.

10. Collaboration and Communication: Enhancing coordination among teams and departments for smoother operations.
11. Supply Chain Integration: Ensuring seamless interactions between suppliers, partners, and internal processes.
12. Workforce Engagement and Empowerment: Involving and motivating employees to contribute to innovation and productivity.

1.8.4 Dimensions of Operations Management

The dimensions of operations management encompass a variety of focus areas that collectively ensure the effective functioning of organizational processes. These dimensions include (Babich et al.,2020).

1. Process Optimization: Streamlining processes to improve efficiency and productivity.
2. Quality Management: Maintaining high standards in production and services.
3. Capacity Planning: Determining the optimal use of resources to meet production demands.
4. Inventory Management: Balancing stock levels to prevent shortages or excesses.
5. Supply Chain Coordination: Integrating all stages of the supply chain for a seamless flow of materials and information.
6. Logistics Management: Managing the transportation and distribution of products to ensure timely delivery.
7. Technology Integration: Implementing tools such as ERP systems, IoT, and automation for enhanced efficiency.
8. Risk Management: Identifying potential disruptions and creating strategies to mitigate their effects.
9. Sustainability Practices: Adopting environmentally friendly approaches that support long-term viability.
10. Workforce Management: Ensuring that employees are well-trained and productive to support operational goals.

1.8.5 The Importance of Operations Management

Operations management plays a crucial role in the success and sustainability of an organization. Its importance can be outlined as follows (Araz et al.,2020).

1. **Enhanced Efficiency and Productivity:** By optimizing processes and resource use, operations management helps achieve higher productivity and cost savings.
2. **Quality Assurance:** Ensures that products and services meet quality standards, which builds customer trust and loyalty.
3. **Customer Satisfaction:** Aligns processes to fulfill customer needs and improve service delivery, enhancing the overall customer experience.
4. **Adaptability and Flexibility:** Operations management equips organizations to respond swiftly to market changes and disruptions, maintaining business continuity.
5. **Risk Reduction:** Through comprehensive risk management practices, it minimizes the impact of potential disruptions on operations.
6. **Cost Management:** Efficient operations management helps reduce waste and control costs, contributing to better financial performance.
7. **Sustainability and Compliance:** Incorporates eco-friendly practices to meet regulatory requirements and support corporate social responsibility.
8. **Innovation and Continuous Improvement:** Promotes a culture of innovation and continuous improvement to keep processes current and competitive.
9. **Strategic Alignment:** Operations management ensures that the organization's processes align with its overall strategy, supporting long-term goals and objectives.
10. **Improved Collaboration:** Facilitates better communication and coordination across departments, contributing to a cohesive and well-integrated organizational approach.

Second Axis :Supply Chain Resilience:

1.8.6 Definition of Supply Chain Resilience

Supply chain resilience refers to the capacity of a supply chain to anticipate, prepare for, respond to, and recover from disruptions while maintaining continuity and minimizing negative impacts on its operations. It encompasses the ability of a supply chain to adapt to changing circumstances, whether those changes stem from sudden disruptions such as natural disasters, pandemics, geopolitical conflicts, or other unforeseen events (Shamsuddin, 2020).

A resilient supply chain is not only reactive but also proactive, capable of identifying potential vulnerabilities and implementing strategies that enhance its ability to withstand and bounce back from challenges. This resilience is achieved through a combination of strategic

planning, process flexibility, redundancy, technological integration, and strong partnerships with suppliers and stakeholders. The ultimate goal of supply chain resilience is to sustain operational performance, ensure customer satisfaction, and maintain a competitive advantage even in the face of significant disruptions. Key aspects of supply chain resilience include flexibility in processes and logistics, diversified sourcing strategies, effective risk management, and the use of advanced data analytics to monitor and respond to potential risks in real-time. By embedding these characteristics into the supply chain, organizations can reduce downtime, maintain service levels, and recover more swiftly from disruptions, ultimately supporting business continuity and long-term success (Lohmer & Lasch, 2020).

1.8.7 Importance of Supply Chain Resilience

Supply chain resilience is crucial for organizations to maintain operational stability and achieve long-term success in an increasingly unpredictable global environment. The importance of supply chain resilience can be outlined as follows (Dohaney et al.,2020).

1. **Continuity of Operations:** A resilient supply chain ensures that operations can continue with minimal disruptions even when faced with challenges such as natural disasters, pandemics, or geopolitical conflicts. This continuity helps prevent interruptions that could result in significant revenue losses and damage to the company's reputation.
2. **Risk Mitigation:** Supply chain resilience allows organizations to identify and mitigate potential risks proactively. Through strategies like diversified sourcing, flexible logistics, and redundancy, companies can minimize the impact of disruptions, safeguarding their supply chain from significant setbacks.
3. **Customer Satisfaction:** Maintaining consistent service levels is critical to meeting customer expectations. A resilient supply chain ensures that products and services are delivered on time, even during disruptions. This reliability strengthens customer trust and loyalty, leading to better customer retention and a stronger market position.
4. **Competitive Advantage:** Companies that invest in building resilient supply chains can respond more swiftly to disruptions compared to their competitors. This agility provides a competitive edge, enabling them to capture market opportunities and maintain their reputation as reliable suppliers even during turbulent times.

5. **Adaptability to Change:** Resilient supply chains are better equipped to adapt to changes in market demands, regulatory environments, and technological advancements. This adaptability allows organizations to pivot strategies and maintain operations under different conditions, enhancing their long-term viability.
6. **Financial Stability:** A resilient supply chain helps prevent financial losses associated with supply interruptions, emergency procurements, and lost sales. By minimizing the costs associated with disruptions, companies can maintain more predictable cash flows and achieve better financial outcomes.
7. **Operational Efficiency:** Implementing strategies that enhance resilience, such as improved process flexibility and advanced technological integration, often results in greater overall operational efficiency. These practices help streamline processes, reduce waste, and improve productivity, even during stable times.
8. **Regulatory Compliance and Reputation Management:** In certain industries, resilience is linked to meeting regulatory standards, especially regarding environmental sustainability and risk management. Maintaining a resilient supply chain ensures compliance with these standards, reducing the risk of penalties and protecting the company's reputation.
9. **Enhanced Collaboration and Communication:** Building supply chain resilience often involves fostering stronger relationships with suppliers, partners, and stakeholders. This enhanced collaboration and transparent communication create a more cohesive supply chain network that can respond collectively to disruptions, improving resilience and efficiency.
10. **Support for Innovation and Growth:** Resilience-focused strategies encourage the adoption of new technologies, such as predictive analytics and automation, which contribute to innovative solutions and long-term growth. Companies that integrate these technologies into their supply chain management are better positioned to handle disruptions and seize new business opportunities.

1.8.8 Components of Supply Chain Resilience

Supply chain resilience is built upon a set of strategic components that enable organizations to anticipate, respond to, and recover from disruptions effectively. These components work together to create a robust and adaptable supply chain. The primary components of supply chain resilience include (Lohmer & Lasch,2020).

1. Flexibility and Agility:
 - Flexibility refers to the ability of the supply chain to change its operations or processes in response to disruptions. This includes diversifying production methods, modifying product types, or re-routing logistics.
 - Agility is the speed at which the supply chain can respond to sudden changes. An agile supply chain can quickly adapt to new market conditions, supply shortages, or unexpected events, ensuring minimal downtime and continuity of operations.
2. Redundancy: Redundancy involves maintaining backup resources, such as multiple suppliers, additional inventory, or alternative transportation options. While this may come at a cost, it provides an essential safety net during disruptions and ensures that critical operations continue without significant interruption.
3. Visibility and Transparency: Real-time visibility throughout the supply chain allows organizations to monitor operations and detect potential issues early. This component involves using technology such as IoT sensors, blockchain, and advanced data analytics to track inventory, shipments, and supplier activities. Transparency enhances trust and collaboration among partners and aids in quick decision-making.
4. Risk Management and Contingency Planning: Effective supply chain resilience requires identifying potential risks and developing comprehensive contingency plans to address them. This involves proactive risk assessment, scenario planning, and creating response strategies to mitigate impacts. Organizations with well-defined risk management practices can respond to and recover from disruptions more effectively.
5. Collaboration and Partner Relationships: Building strong relationships with suppliers, logistics providers, and other partners enhances resilience by fostering a cooperative approach to problem-solving. Collaborative partnerships enable shared resources and information, which supports joint efforts to manage and overcome disruptions.
6. Technology Integration: Leveraging technology, such as predictive analytics, artificial intelligence, and real-time data processing, enhances supply chain resilience by providing actionable insights and facilitating rapid response strategies. Technology also supports automation, which can improve efficiency and reduce the reliance on manual processes during disruptions.

7. **Sustainable Practices:** Sustainability in the supply chain helps ensure long-term resilience. This includes using environmentally friendly practices, managing energy resources efficiently, and complying with environmental regulations. Sustainable supply chains are better positioned to endure and adapt to changes in environmental policies and consumer expectations.
8. **Workforce Preparedness and Training:** A well-trained workforce is crucial for managing disruptions effectively. Regular training programs that focus on emergency response procedures, technological competencies, and cross-functional collaboration equip employees to respond swiftly and effectively to crises.
9. **Adaptable Supply Chain Design:** Designing the supply chain to be adaptable from the start enables companies to pivot operations when disruptions occur. This includes building modular processes, scalable logistics solutions, and adaptable supply chain infrastructure to handle different levels of demand or changes in production needs.
10. **Continuous Improvement and Learning:** Emphasizing a culture of continuous improvement allows organizations to learn from past disruptions and refine their processes over time. Post-disruption assessments and feedback loops are essential for understanding what worked, what didn't, and how to improve future responses.
11. **Financial Resilience:** Maintaining financial reserves or having access to flexible financing options supports supply chain resilience by enabling companies to absorb the financial shocks of disruptions. Financial resilience ensures that resources are available for recovery and investment in mitigation strategies.
12. **Supply Chain Diversification:** Diversifying the supplier base and production locations reduces the risk of dependency on a single source. By spreading operations across different regions and suppliers, the supply chain becomes more resilient to localized disruptions such as natural disasters or geopolitical issues.

1.8.9 Key Dimensions of Operations Management Contributing to Supply Chain Resilience

Operations management involves various dimensions that are integral to bolstering supply chain resilience, each contributing to an organization's ability to adapt, respond, and recover from disruptions effectively. One of the most significant dimensions is process optimization. This aspect involves continuously refining workflows and production processes to eliminate inefficiencies,

reduce costs, and enhance productivity. By maintaining streamlined and efficient processes, an organization can adapt swiftly to disruptions or shifts in demand, ensuring that the supply chain remains functional and resilient even in challenging times (Choi et al.,2023).

Quality management is another critical dimension, as it ensures that products and processes meet or surpass established standards. Implementing quality management frameworks like Total Quality Management (TQM) and Six Sigma helps minimize the risk of defects and service failures, which is especially important during disruptions when consistent quality can prevent a cascade of issues. Operations management's emphasis on quality reassures customers and supports trust, a vital element for maintaining business during unstable periods.

Risk management plays a fundamental role in supply chain resilience. Operations management integrates comprehensive risk assessments and proactive mitigation strategies to identify potential vulnerabilities within the supply chain. This includes analyzing past data, forecasting potential issues, and developing contingency plans that enable a swift response when disruptions occur. By embedding risk management into operational planning, companies can reduce the potential impact of unexpected events, ensuring that operations can continue with minimal disruption (Helo & Hao, 2022).

Flexibility and agility are also essential dimensions that operations management promotes within the supply chain. Flexibility refers to the ability to alter production processes or adjust logistics strategies as needed, while agility is the speed with which these changes can be executed. By cultivating flexible and agile processes, organizations are better prepared to pivot in response to unforeseen disruptions, such as supplier shortages or logistical constraints, and can do so without significant delays (Terwiesch ,2023).

The integration of technology has become a cornerstone of modern operations management and plays a pivotal role in enhancing supply chain resilience. Advanced tools like the Internet of Things (IoT), predictive analytics, and real-time data processing allow for better visibility and more informed decision-making. Operations management harnesses these technologies to anticipate disruptions, improve response times, and maintain operational consistency. Automation and AI-driven insights further enhance the speed and effectiveness of responses during disruptive events.

Inventory management is also crucial for maintaining resilience. Effective operations management ensures that inventory levels are kept at optimal points, balancing readiness with cost efficiency. Techniques such as Just-In-Time (JIT) and strategic buffer stocks help organizations maintain operations even when primary supply sources are disrupted. This careful management of inventory allows the supply chain to operate smoothly during unexpected challenges, preventing costly shortages or overstocking. Collaboration and communication within and beyond the organization are key to a resilient supply chain. Operations management fosters coordination between departments, suppliers, and external partners, ensuring that all parties are aligned in their strategies and responses. Transparent communication channels facilitate the quick dissemination of information and support effective decision-making, which is critical during disruptions to maintain cohesion and mitigate impacts (Benjaafar & Hu,2020).

Continuous improvement and innovation form another essential dimension of operations management that contributes to resilience. The principle of ongoing assessment and refinement allows organizations to learn from past disruptions, adapt processes, and implement innovations that improve performance. A culture of continuous improvement ensures that supply chain practices evolve over time, enabling organizations to respond better to future challenges. Lastly, sustainability and environmental responsibility are becoming increasingly important in operations management. Sustainable practices help build a resilient supply chain by minimizing environmental impact and aligning with regulatory requirements. This focus not only mitigates potential disruptions related to non-compliance but also supports broader corporate social responsibility goals. Eco-friendly practices, such as waste reduction and energy optimization, contribute to long-term resilience by fostering a sustainable operational model (Shamsuddin,2020).

1.8.10 Theoretical Foundations Linking Operations Management and Supply Chain Resilience

The theoretical foundations linking operations management and supply chain resilience draw from established concepts in both fields, emphasizing strategies and practices that enable organizations to maintain stability and adaptability in the face of disruptions. One essential theory is Lean Management, which originated from the Toyota Production System. Lean management focuses on eliminating waste and improving efficiency, which contributes significantly to an agile

and flexible supply chain. By streamlining processes and maintaining only essential functions, lean practices enable organizations to pivot quickly when faced with unexpected challenges, ensuring that operations remain resilient and responsive (Hashmi ,2022).

Total Quality Management (TQM) is another foundational theory that enhances supply chain resilience by embedding quality assurance and continuous improvement across all processes. TQM ensures that operations meet or exceed consistent quality standards, minimizing the risk of defects and service failures that could disrupt supply chain stability. This focus on quality builds reliability into the supply chain, which is crucial during times of disruption when consistent performance is necessary to maintain trust and operational continuity. Six Sigma, with its data-driven approach to reducing process variability, further supports the connection between operations management and supply chain resilience. By identifying and eliminating sources of inefficiency and error, Six Sigma methodologies enhance the predictability and stability of operations. This predictability is vital for maintaining continuous service delivery during disruptions, as it allows for more controlled and confident decision-making in crisis scenarios. Six Sigma's emphasis on data analysis also aligns with proactive risk management, enabling organizations to anticipate potential issues before they escalate into significant disruptions (Aityassine et al.,2022).

The Dynamic Capabilities Framework, developed by David Teece and colleagues, provides a valuable perspective on how operations management supports supply chain resilience through adaptability. This framework highlights the ability of organizations to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. Operations management practices that foster dynamic capabilities enable companies to sense and respond to shifts in their operating environment, seize emerging opportunities, and transform processes to maintain stability. This adaptability is a core element of supply chain resilience, allowing for a responsive and flexible approach to unexpected events.

Risk management theories also play a crucial role in linking operations management to supply chain resilience. The Enterprise Risk Management (ERM) Framework emphasizes identifying, assessing, and mitigating risks as a proactive measure. Integrating risk management into operational planning helps organizations develop contingency plans and prepare for potential disruptions, ensuring that the supply chain can respond swiftly and maintain continuity. This

theoretical approach reinforces the importance of being prepared and having structured responses to mitigate the effects of unforeseen events (Shamsuddin, 2020).

The Network Theory of supply chain resilience emphasizes the importance of interconnected relationships within the supply chain. According to this theory, the strength and resilience of a supply chain are influenced by the collaborative networks between suppliers, partners, and customers. Operations management practices that foster strong communication and coordination enhance supply chain resilience by ensuring that all stakeholders can collaborate effectively during disruptions. This theoretical foundation underscores the critical role of operations management in building robust partnerships and fostering seamless information flow across the supply chain (Lohmer & Lasch, 2020).

The Resource-Based View (RBV) theory aligns with operations management by focusing on how organizations use their unique resources and capabilities to gain a competitive advantage. Operations management optimizes the use of these resources to build a resilient supply chain infrastructure. By leveraging resources such as skilled manpower, advanced technology, and strategic partnerships efficiently, organizations can create supply chains that are not only efficient under normal conditions but also capable of adapting to changing circumstances (Wong et al.,2020).

The Technology-Organization-Environment (TOE) Framework supports understanding the adoption of technology in operations management and its role in enhancing supply chain resilience. The TOE Framework explains how technological integration, such as predictive analytics, artificial intelligence (AI), and the Internet of Things (IoT), contributes to real-time monitoring and data-driven decision-making. Operations management leverages these technologies to maintain visibility across the supply chain and proactively address disruptions, thus strengthening resilience (Shishodia et al.,2023).

Finally, the Just-In-Time (JIT) principle, while primarily aimed at minimizing inventory and improving efficiency, presents a nuanced aspect of resilience. While JIT helps reduce holding costs and streamline processes, it can pose challenges during disruptions due to limited stock levels. Therefore, operations management must balance JIT with strategic inventory buffers to maintain resilience. This balance underscores the importance of adaptive inventory strategies that align lean operations with the need for readiness during disruptions.

These theoretical foundations collectively illustrate how operations management principles and practices contribute to building supply chain resilience. From lean management and TQM to dynamic capabilities and risk management theories, operations management provides a comprehensive framework for ensuring that supply chains can adapt, respond, and recover effectively, safeguarding business continuity and long-term competitiveness (Zamani et al.,2023).

1.8.11 Challenges and Barriers in Implementing Operations Management for Resilience

Implementing operations management practices to enhance supply chain resilience is essential for ensuring that organizations can adapt and respond effectively to disruptions. However, the process is not without its challenges and barriers. One of the significant challenges is resource limitations. Operations management initiatives aimed at building resilience often require substantial financial investments, whether in technology, training, or process re-engineering. Smaller organizations or those with limited budgets may struggle to allocate the necessary resources to implement these changes effectively. This can result in partial implementation, which fails to deliver the full benefits of enhanced resilience (Spieske et al.,2021).

Technological integration poses another barrier to implementing operations management for resilience. The adoption of advanced tools, such as predictive analytics, artificial intelligence (AI), and the Internet of Things (IoT), can be complex and resource-intensive. Organizations may face difficulties in aligning these technologies with their existing processes or may lack the expertise to manage and maintain them. This integration challenge can hinder the effective use of technology that would otherwise provide critical real-time data and predictive insights essential for building a resilient supply chain.

Workforce training and development is also a crucial yet challenging aspect of implementing operations management for resilience. Employees need to be equipped with the right skills to operate new technologies, follow updated procedures, and respond effectively to disruptions. However, training programs can be costly and time-consuming, and ensuring that the entire workforce is adequately prepared can be difficult, particularly in larger organizations or those with high turnover rates. Without comprehensive training, the workforce may not be able to utilize new processes and tools to their full potential, limiting the effectiveness of resilience-building initiatives (Zhao et al.,2023).

Resistance to change within the organization is another common barrier. Implementing new operations management practices often requires significant changes to existing workflows and structures, which can meet resistance from employees who are accustomed to traditional methods. This resistance can slow down the adoption of new practices and affect their effectiveness. Change management strategies are essential to mitigate this barrier, but they require careful planning and execution to foster a culture that embraces adaptability and continuous improvement.

Supply chain complexity also adds to the challenges of implementing operations management for resilience. Many organizations have intricate supply chains involving numerous suppliers, partners, and logistics providers spread across different geographies. Coordinating resilience efforts across such a network can be difficult, as it requires consistent communication, alignment of strategies, and collaboration with various stakeholders who may have differing priorities or levels of capability. Data management and transparency are critical for effective operations management, but they present their own set of challenges. Ensuring accurate and timely data flow across the entire supply chain is essential for making informed decisions during disruptions. However, organizations often struggle with data silos, inadequate data quality, and limited data-sharing practices among supply chain partners. Without comprehensive and reliable data, it is difficult to implement strategies that effectively enhance resilience (Ozdemir et al.,2022).

Another challenge is maintaining balance between efficiency and resilience. Operations management traditionally focuses on optimizing processes to reduce costs and improve efficiency. However, the strategies that build resilience, such as maintaining higher inventory levels or diversifying supplier bases, can sometimes conflict with lean management practices aimed at minimizing waste and inventory. Striking a balance between maintaining cost-effective operations and ensuring the supply chain's ability to withstand disruptions can be a difficult task for organizations. External factors, such as regulatory requirements and geopolitical issues, can also act as barriers to implementing operations management practices for resilience. Organizations operating in regions with strict regulatory standards or political instability may face additional challenges in coordinating their supply chain resilience strategies. Compliance with varying regulations across different markets can increase complexity and limit the organization's ability to implement uniform resilience practices. Lastly, sustainability concerns are becoming increasingly

intertwined with resilience strategies. While sustainable practices contribute to long-term supply chain resilience, they often require significant changes to operations that can be challenging to implement. The shift toward eco-friendly processes and the management of carbon footprints can present both logistical and financial challenges, adding another layer of complexity to operations management (Adekola & Clelland,2020).

1.9. Methodology and research methods

This study adopted a descriptive analytical approach to comprehensively evaluate the current level of implementation of operations management practices within Saudi Basic Industries Corporation (SABIC). The aim was to systematically investigate the role of operations management in enhancing the flexibility and adaptability of SABIC's supply chain. Additionally, the research sought to identify and thoroughly analyze the challenges SABIC faces in applying these operations management practices within its supply chain framework. Lastly, the study aimed to develop and propose targeted strategies and best practices that could effectively improve the integration of operations management into SABIC's supply chain, with the ultimate goal of enhancing its flexibility and resilience. This approach ensured an in-depth understanding of the existing processes, potential gaps, and opportunities for improvement to support the company's strategic objectives.

1.10. Study tools

To achieve the objectives of this study, a questionnaire will serve as the primary tool for data collection, designed to gather comprehensive and detailed insights from participants regarding their perspectives and experiences related to the topic. This approach ensures that the data reflects firsthand insights, providing a robust foundation for analysis.

The collected data will be analyzed using various statistical methods to ensure precision and reliability. To assess the reliability and stability of the questionnaire, Cronbach's alpha coefficient will be employed as a key indicator for measuring internal consistency, verifying that the instrument is dependable for gathering consistent data. Furthermore, the arithmetic mean and standard deviation will be calculated to explore the central tendency and dispersion within the dataset, allowing for an understanding of response patterns and the identification of overall trends.

To evaluate the relationships between the different variables, linear regression analysis will be conducted, enabling the determination of the extent to which the independent variables (dimensions of operations management) influence the dependent variable (supply chain resilience). This comprehensive statistical analysis approach will provide a deeper and more accurate interpretation of the data, strengthening the validity of the study's findings and enhancing the overall reliability and effectiveness of the results.

1.11. Study limitations

1. **Temporal Limitations:** This study will be conducted over the course of 2024, ensuring that the data collection and analysis capture contemporary practices and challenges within the specified timeframe.
2. **Spatial Limitations:** The research will be limited to the Saudi Basic Industries Corporation (SABIC), focusing specifically on its operations and supply chain management practices within its various facilities and operational units.
3. **Objective Limitations: The study aims to**
 - Comprehensively evaluate the current level of implementation of operations management practices at SABIC.
 - Systematically investigate the role of these practices in enhancing the flexibility and adaptability of SABIC's supply chain.
 - Identify and thoroughly analyze the challenges SABIC encounters in applying operations management practices within its supply chain framework.
 - Develop and propose targeted strategies and best practices to improve the integration of operations management into SABIC's supply chain, with the ultimate goal of enhancing its flexibility and resilience.
4. **Human Limitations:** The study will involve a targeted sample of employees at SABIC, including managers, operations specialists, supply chain professionals, and other relevant staff members. These individuals will provide critical insights into the practical application and effectiveness of operations management practices within the organization.

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